Canada Mortgage and Housing Corporation

Société canadienne d'hypothèques et de logement

CMHC Helping to house Canadians

INDOOR AIR QUALITY SURVEY:

CMHC IAQ KIT

INSTRUCTIONS

CMHC IAQ KIT INSTRUCTIONS

- PF-1 Formaldehyde kit (2 tubes/kit)
- AIMS Air change kit
- AIMS Data Sheet
- CO_2 Drager Diffusion tubes
- CO Short duration Drager tubes
- Drager hand pump
- RAD M-1 Surveymeters
- RADPAC Charcoal Canisters
- BLP Relative Humidity kits (3 tubes/kit)
- Air Check NO_2 kits (2 tubes/kit)

INSTRUCTIONS FOR USE OF PF-1 FORMALDEHYDE MONITORS:

1. Remove all materials from the envelope. You will find:

- a box containing two PF-1 formaldehyde monitors and mounting pins.
- two numbered identification labels
- a pre-addressed mailing envelope.

2. Take the monitors and pins out of the box. **SAVE** the box and envelope — you will need them to return the monitors to the laboratory after the test.

3. Decide where you want to hang the monitors. Choose rooms where you spend a lot of time, such as a living room, bedroom, or office. The monitors may be hung in the same room or in different rooms. If your house has two levels, we suggest hanging one monitor on each level.

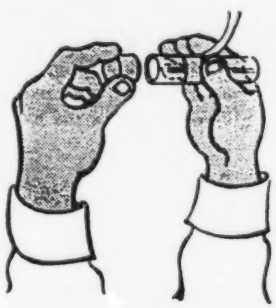
4. Fill out one identification label for each monitor. Write the **location, start date** and **start time** (to the nearest hour — be sure to circle **am** or **pm**) on each label.

ID#
Location:

	Time:	**am**
Start date:		**pm**
Stop date:	**Time:**	**am**
		pm

5. Remove the monitors and pins from the plastic bags, and unwind the ribbon that is wrapped around each vial. DO NOT DETACH THE RIBBON. Peel off the backing of the identification label and attach one to each monitor as shown. Use only the labels provided. DO NOT PLACE THE LABEL OVER THE RIBBON.

6. **Start the test.** Remove the cap from one monitor and place it on the other end of the tube.



7. Install the monitor in the room marked on the identification label by pushing the mounting pin through the end of the ribbon and into the ceiling, well away from the wall. This is the best place to hang the monitor. If you can't hang the monitor from the ceiling, you may shorten the ribbon and hang it from a door jamb or light fixture. Make sure that it hangs at least two feet (24") away from any wall. DO NOT hang monitors where they may be subjected to strong drafts, for instance in front of open windows or doors.

8. Repeat steps 6 and 7 for the second monitor.

9. Put these instructions in a safe place so that you will know what to do with the monitors after they have been exposed.

10. Monitors should be left hanging undisturbed for no less than 120 hours (5 days) and no more than 168 hours (7 days).

11. When the test period is over, remove the monitors from the ceiling. **Stop the test immediately** by placing the cap tightly over the **open** end of each monitor, just as it was before the start of the test.

12. Write the actual **stop date** and **stop time** (to the nearest hour — be sure to circle **am** or **pm**) on **each** identification label. THIS IS VERY IMPORTANT! THE LABORATORY CANNOT GIVE YOU AN ACCURATE RESULT IF THE DATES OR TIMES ARE MISSING.

13. Put the two tightly capped vials in the shipping box and close the box. Put **only** the monitors in the box.

14. Put the box in the return envelope and seal. Put **only** the box in the envelope. Mail the envelope as soon as possible.

TEST RESULTS:

You will receive a report by mail in about two weeks. It will show the level of formaldehyde as measured by the monitors. A booklet will be included containing information to help you evaluate the results and compare them to others.

AIR QUALITY RESEARCH

901 Grayson Street, Berkeley, CA 94710 U.S.A.
(415) 644-2097

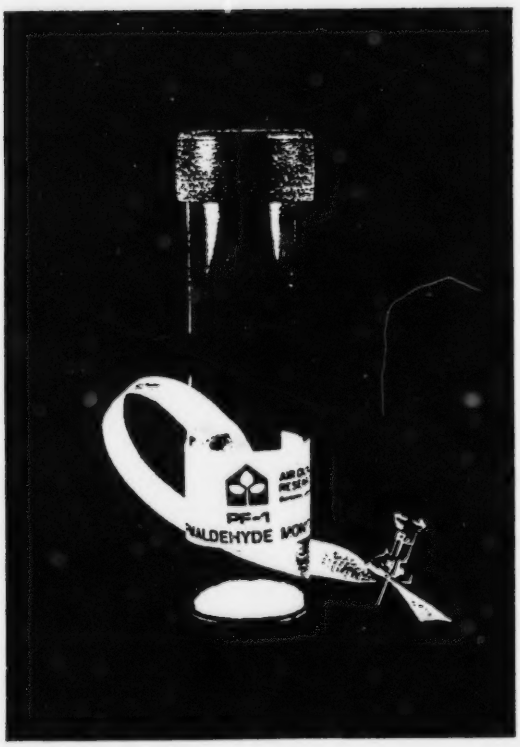
WARRANTY

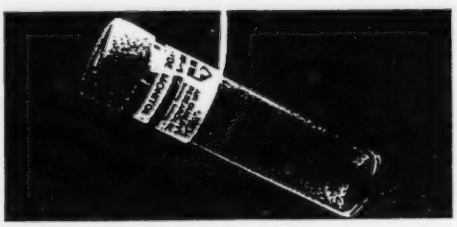
OPERATING CHARACTERISTICS OF THE PF-1 PASSIVE FORMALDEHYDE MONITOR

(When used in accordance with instructions provided by **Air Quality Research, Inc.**)

Sampling Time:	5-7 days (120 - 168 hours)
Range and Precision	
Minimum detection limit ± precision (RSD)	0.01 ppm ± 30%
Optimum exposure range ± precision (RSD)	0.025-1.0 ppm ± 15%
Stability:	
Established shelf life prior to exposure	6 months
Established shelf life after exposure	1 month
Relative Humidity Range:	30 - 80% RH

Air Quality Research warrants that the goods sold herein will be free from defects in material and workmanship and will meet the aforementioned specifications. This warranty shall be limited to the replacement of defective monitors. IT IS EXPRESSLY AGREED THAT THIS WARRANTY SHALL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND IN LIEU OF THE WARRANT OF MERCHANTABILITY.





ABOUT THE PF-1 MONITOR KIT

The PF-1 passive formaldehyde monitors will sample the air in your home or office. Sampling begins when the cap is removed from the glass tube. Formaldehyde in the air can then diffuse into the tube and will collect on the filter at the bottom of the tube. The filter is treated with a non-toxic chemical that absorbs formaldehyde. You will not notice any color change in the filter during the sampling period; the actual amount of formaldehyde collected can be determined only by laboratory analysis.

IMPORTANT! READ ALL INSTRUCTIONS BEFORE BEGINNING TEST.

—WARNING—

DO NOT open the vials until you are ready to begin the test.

DO NOT put anything in the vials.

DO NOT conduct the test when the average indoor relative humidity is greater than 80%.

NAHB/AIMS SAMPLING INSTRUCTIONS

You will receive your AIMS sampling devices in two separate packages, mailed on two different days. One package is "EMITTER", the other package is "RECEIVER". The emitters will arrive first.

INSTRUCTIONS FOR INSTALLING THE EMITTERS

When the emitters arrive, remove them from the resealable plastic bags, and keep the bags. They will be used to return the emitters at the conclusion of the measurement period.

The emitters as received are ready for use. They must be installed for a period of at least 24 hours before the receivers are installed. We therefore recommend that the emitters be installed as soon as they arrive.

Push-pin holders are supplied with the emitters. To install the emitters, insert them into the push-pin holders. The holders should then be placed in the room or area where measurements are to be made, at locations that are one to two feet from an outside wall (an outside wall is a wall on the perimeter of the house). Emitters are to be installed inside the house (not outside). If more than one emitter is used, they can be placed at corners of a room or zone that are diagonal to each other, or in opposite sides or corners in areas consisting of more than one room. Recommendations for placement of emitters in different types of rooms and homes are provided in the accompanying diagrams.

If you are planning to conduct tests on three different areas or zones in a house, three different types of emitters will be supplied. Each emitter emits a different type, colorless, odorless, harmless perfluorocarbon (gas). This makes it possible to conduct measurements up to three different areas of the house simultaneously.

The three types of emitters are color-coded. The color code, along with recommended installation areas for each type of emitter, is as follows:

Perfluorocarbon Type and Code	Color	Recommended Installation Area
PMCP-8	LIME	BEDROOM
PMCH-2	RED	LIVING-DINING ROOMS
PDCH-3	GOLD	BASEMENT

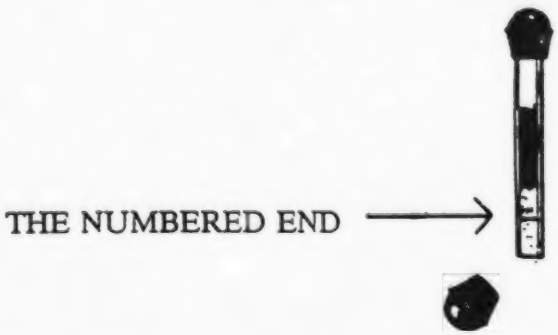
Emitters should NOT be placed in or close to the following:

- Kitchens
- Stairways
- Bathrooms
- Laundry rooms
- Ventilation systems
- The vicinity of heating or air conditioning equipment, or other areas of temperature extremes

Emitters in their push-pin holders can be installed in various places, such as the legs of chairs or tables, interior walls, picture frames hanging on such walls, or unlit candles. The height of the place where the emitter is installed is not a critical concern. Generally, they can be placed approximately 4 to 6 feet above floor level. As a reminder, **the emitters are temperature sensitive** and should **NOT** be placed on or near an object that is at a significantly different temperature than the average temperature in the zone. An ideal location is near an outside wall so that the perfluorocarbons can be mixed with incoming air and distributed uniformly throughout the zone.

INSTRUCTIONS FOR INSTALLING THE RECEIVERS

When the receivers arrive, remove them from the resealable plastic bags in which they arrive, and keep the bags; the receivers will be placed in the bags for return to NAHB/NRC at the conclusion of the measurement. **UNCAP THE NUMBERED END ONLY OF EACH RECEIVER. IT IS IMPORTANT TO LEAVE THE OTHER END OF THE RECEIVERS CAPPED.**



When the cap has been removed from the numbered end, the receiver should be inserted into the push-pin holder, and the cap that has been removed from the numbered end should be placed over the small hook on the holder. This will prevent loss of the cap, which will be needed to recap the receiver after completion of the test.

When the numbered end of each receiver has been uncapped, the receivers are ready to receive perfluorocarbon(s) from the emitters.

The receivers should then be installed in the room or area to be measured, at least eight feet from the nearest emitter, and, preferably, at a height of from three to six feet. If two or more receivers are to be installed in the area, they may be placed a few feet apart. **All receivers should be located in the central area of the room or zone.** Recommendations for placement of receivers in different types of rooms and homes are provided in the accompanying diagrams.

When the receivers are in place, it is important to record the start date, time, temperature, house volume and other pertinent information, on the AIMS Data sheet.

Receivers should not be placed in locations or areas where they will be subject to significant drafts, air currents, or ventilation. Specifically, do **NOT** place them in or close to the following:

- Kitchens
- Stairways
- Bathrooms
- Laundry rooms
- Ventilation systems
- The vicinity of heating or air conditioning equipment, or other areas of temperature extremes

It is important **NOT** to expose receivers to higher levels of humidity than pertain in general throughout the house. Do **NOT** place them near water supplies or other humid locations.

Do **NOT** attempt to conduct measurements in the presence of high levels of volatile chemicals such as wet paint, household deodorant, aerosol sprays and pesticides, gasoline, and solvents.

As with emitters, receivers should be placed out of reach of children.

DURATION OF MEASUREMENT

The emitters and receivers should remain in place for a minimum of one week. The recommended time period is two weeks. Although they can remain in place longer, a measurement period of two weeks will provide the desired data.

Accuracy of the test can be improved by the following:

- Taking a single daytime and night time temperature reading everyday that the test is in progress;
- Taking the average of these readings at the conclusion of the measurement period; and
- Entering this information on the AIMS Data Sheet.

RETURN OF EMITTERS AND RECEIVERS

When the measurement is completed, remove and RECAP THE RECEIVERS. They should be dealt with and mailed with the data sheets before the emitters are dismounted.

Record the date and time of conclusion of the measurement, and the temperature, on the AIMS Data Sheets. Any other pertinent information that has not yet been entered on the Data Sheets, should be filled in at this time.

If more than one house has been measured, use a separate Data Sheet for each house. Sort all receivers by houses, and put them in the resealable plastic bags in which they were received. Complete an AIMS Data Sheet for each house, and attach the corresponding receivers to each sheet.

RETURN THE RECEIVERS AND DATA SHEETS TO:

NAHB NATIONAL RESEARCH CENTER
AIMS Laboratory
400 Prince George's Blvd.
Upper Marlboro, MD. 20772-8731

A REMINDER: Be sure to fill out the Data Sheets completely. Data Sheets that are incompletely filled out will be returned for completion, which will delay analysis and reporting of the results.

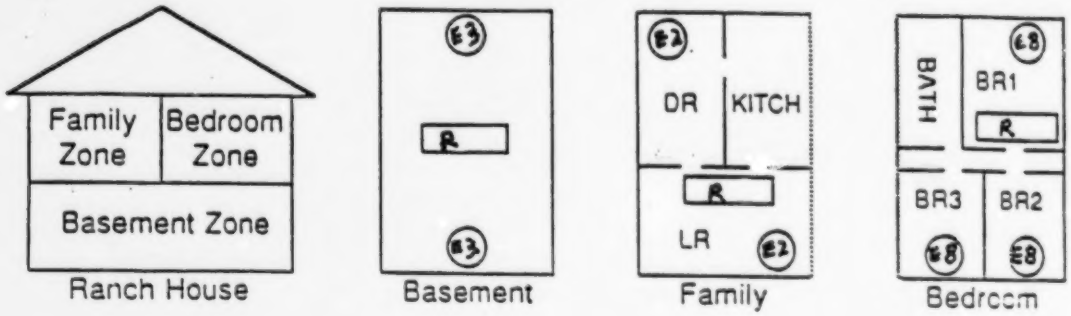
Next, dismount the emitters and mail them to:

NAHB/NRC AIMS
P.O. Box 1584
Bowie, MD. 20716-0184

Ten Dollars will be charged for each emitter that is not returned to our laboratory after completion of test. A fee of Twenty Dollars will be added to the accounts of parties retaining the equipment for a period of greater than three months.

DEPLOYMENT OF EMITTERS AND RECEIVERS

One-Story, Ranch Style House with a Basement



Basement Zone

Emitters (E)- Place two type-3 emitters on opposite ends of the basement. If an obstruction exists, place all emitters on either side of the obstruction.

Receivers (R)- Place the receiver in the center of the basement or within the largest open area.

Family Zone

Emitters (E)- Place two type-2 emitters within the two largest rooms.

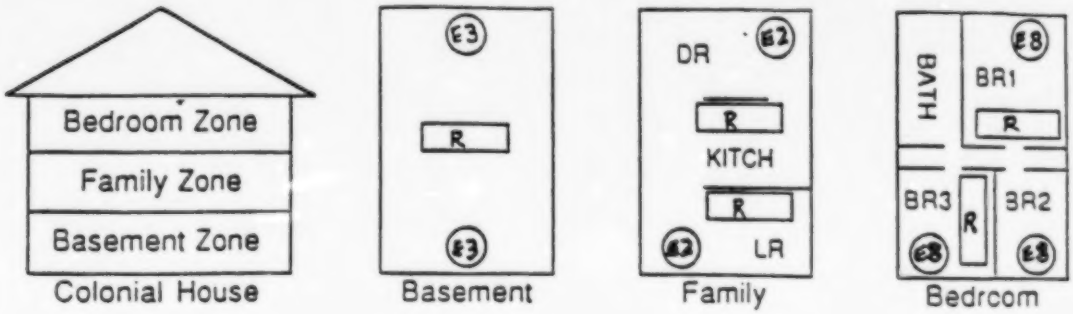
Receiver (R)- Place receiver in the largest room.

Bedroom Zone

Emitters (E)- Place one type-8 emitter in each bedroom.

Receiver (R)- Place a receiver in the largest bedroom in the zone.

Two-Story, Colonial Style House with a Basement



Basement
Emitters (E)- Follow directions for ranch house.
Receiver (R)- Follow directions for ranch house.

Family Zone
Emitters (E)- Place two type-2 emitters in the rooms at opposite ends of the zone.
Receiver (R)- Place two receivers in the two largest rooms in this zone, towards the center, but away from each other.

Bedroom Zone
Emitters (E)- Follow directions for ranch house.
Receiver (R)- Place two receivers in the two largest bedrooms within this zone.

NAHB/NRC - AIMS
400 Prince Georges Center Boulevard
Upper Marlboro, MD 20772-8731
(301) 249-4000 ext. 647

DATA SHEET for Two-Zone Analysis

Name of User: _____ Company: _____

Address: _____

City: _____ State: ____ Zip Code: ☐☐☐☐☐

Telephone: _____

Project Title: ☐☐☐☐☐☐☐☐☐☐

House I.D.: ☐☐☐☐☐☐☐☐☐☐

Check all types of construction that apply:

1. House Age: ____ year(s)

2. Dwelling Type:

Ranch	____	1 Story	____
Colonial	____	2 Story	____
Cape Cod	____	w/ garage	____
Split Foyer	____	w/ basement (finished)	____
Townhouse	____	w/ basement (unfinished)	____
Apartment	____		

3. Heat Type:

Heat Pump	____
Gas Heat	____
Oil Heat	____
Electric Resistance Heat	____

4. Internal Features

Fireplace	____
Woodstove	____
Central Air	____
Ceiling Fan	____
Cathedral Ceiling	____

5. External Features

All brick	____
Brick front	____
Wood Siding	____
Aluminum Siding	____
Vinyl Siding	____

NAHB/NRC - AIMS
DATA SHEET for TWO-ZONE Analysis

Project Title: ☐☐☐☐☐☐☐☐☐☐
House I.D.: ☐☐☐☐☐☐☐☐☐☐

Start Date: ___/___/___ (mo day yr) Start Time: ____:____ (24 hr clock)

Stop Date: ___/___/___ (mo day yr) Stop Time: ____:____ (24 hr clock)

Zone #1-Description: _____
[redacted] area; if not, please describe here.
Basement

# of PMCH-2E (RED) Emitters ____
# of Receivers ____

Avg. Temp. (°F): _____ Total Volume (ft³): _____

Receiver ID#	Room	Receiver Placed On	Room	Emitter Placed On

Zone #2-Description: _____
Kitchen, Dining, Living; if not, please describe here.

# of PDCH-3E (GOLD) Emitters ____
# of Receivers ____

Avg. Temp. (°F): _____ Total Volume (ft³): _____

Receiver ID#	Room	Receiver Placed On	Room	Emitter Placed On

ptional: On the spaces provided below you may wish to include/draw a floor plan indicating locations of emitters and receivers.

ZONE #1

ZONE #2

DRÄGER Diffusion Tube
Carbon dioxide 1%/a-D

81 01 051

OPERATING INSTRUCTIONS 234-8101051e · 1st Edition · October 1984

1 General and Application
Determination of the mean carbon dioxide concentration over a prolonged period of time (15 minutes to a maximum of 8 hours). No pump is needed to carry out measurement.

2 Description
See illustration

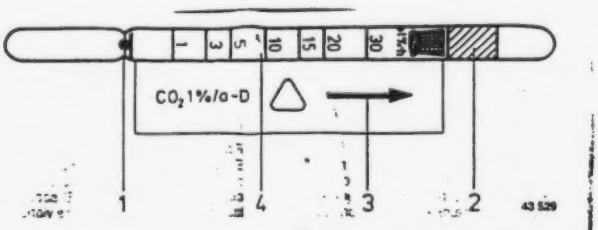


Fig. 1
1 Tube breaking bead, marked with red dot
2 Writing surface
3 Arrow (for measurement, the diffusion tube is pushed into the holder in the direction of the arrow)
4 Indicating layer (blue) with calibrated scale

Fig. 2.1
The diffusion tube is broken at the breaking bead (red dot is visible in the uncovered part of the holder). The holder protects the hands from glass splinters

Fig. 2.2
Diffusion tube in the holder during measurement

3 Measuring principle
On the basis of diffusion processes in gases, the CO_2 molecules to be measured automatically flow to the reagent layer in the indicating tube, which is opened at one end. Here the carbon dioxide reacts with the chemicals on the carrier layer, giving a change in colour from blue to white. The indication is given in vol.% × hours. The mean carbon dioxide concentration can be calculated from the length of the discoloured zone and the exposure time.

3.1 Range of measurement (20°C, 1013 mbar, corresponding to 20°C, 760 mm Hg)
1 to 30 (vol.% × h). With measuring times between 1 and 8 hours, the following ranges of measurement, related to concentration in vol.% can be given:

Duration of measurement	Range of measurement
1 hour	1 to 30 vol.%
3 hours	0.3 to 10 vol.%
5 hours	0.2 to 6 vol.%
8 hours	0.13 to 4 vol.%

4 Use and evaluation
4.1 Note the measurement starting time on the writing surface of the diffusion tube.
4.2 To open the diffusion tube, push it into the holder in the direction opposite to the arrow until the bead on the tube rests against the hinge, whereby the red dot on the tube must be visible at the open end of the holder. Hold the tube and holder with the open end pointing away from the body and break off the tube against the hinge (Fig. 2.1). Carefully remove the tube parts from the holder.
4.3 Push the tube half with the indicating layer as far as it will go in the direction of the arrow into the top part of the holder and click it into the bottom half. Now push the tube down until the glass rim of the open end rests against the bottom part of the tube holder.
Depending upon the measurement required, the diffusion tube is either placed at the desired spot for the duration of the measuring phase or, for personal monitoring, is clipped to the clothing of the person concerned. The maximum total measuring time is 8 hours, but shorter measuring periods are possible. Note the end of the measuring phase (time) on the writing surface of the tube and calculate the time difference (duration of measurement).
4.4 If the air sample contains carbon dioxide, the blue indicating layer turns white. The total length of the discoloration is a measure of the mass of carbon dioxide which has reacted in the indicating tube.
Calculation

$$\text{CO}_2 \text{ concentration in vol.\%} = \frac{\text{detector tube indication}}{\text{duration of measurement in hours}}$$

Examples:

Detector tube indication	Duration of measurement	Concentration
10 vol.% × h	4 hours	2.5 vol.%
5 vol.% × h	8 hours	0.6 vol.%
1 vol.% × h	8 hours	0.13 vol.%

5 Remarks
Evaluate the indication immediately after measurement

6 Influence of ambient conditions on the result of measurement
6.1 Temperature
Temperature affects the diffusion of the molecules and the chemical behaviour of the indicating preparation. Consequently, at temperatures other than 20°C, the test result should be multiplied by the following conversion factors:

Temperature	Conversion factor
0°C	1.3
40°C	0.8

6.2 Humidity
The printed tube scale relates to app. 1 to 15 mg H_2O/L (at 20°C), corresponding to a relative humidity of 5 to 90%.
6.3 Atmospheric pressure
For pressure correction, multiply the tube reading by the following conversion factor:

$$\text{Conversion factor} = \frac{1013}{\text{actual atmospheric pressure in mbar}}$$

7 Specificity (cross-sensitivity)
The indication is based on the reaction of carbon dioxide with alkali, the consumption of which indicated by an indicator.
The following have no influence on the indication over an 8-hour period of measurement of 1 vol.% CO_2: 100 mL/m³ (ppm) NH_3, 50 mL/m³ (ppm) SO_2, 50 mL/m³ (ppm) NO_2, 50 mL/m³ (ppm) H_2S, 25 mL/m³ (ppm) HCl.

8 Shelf life
For expiry date and storage temperature, see data on package strip.

9 Toxicity data
Threshold limit value (USA 1982): 5000 mL/m³ (ppm) corresponding to 0.5 vol.%

10 Information
At the request of the tube user, we will supply the following information:
a) The methods used for calibration of the detector tubes
b) The effects (including reactions) on the operation and accuracy of the gas detector tube caused by specific environmental conditions described by the user, if the effects are known to us

Caution!
Do not carelessly discard used DRÄGER Tubes such that they can fall into the hands of children. The contents are corrosive!

Dräger Tube
Carbon Monoxide 2/a

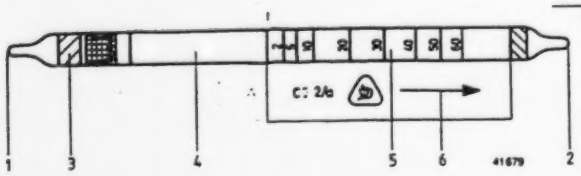
67 33 051

Instructions for use 234-33051e · 3rd Edition · November 1986

1 General and Application
Determination of carbon monoxide CO in air.
The tubes are to be used in conjunction with the Dräger Gas Detector Pump Model 31.
For use, see section 4 of these Operating Instructions and Instructions for Use 4341e.

Important:
It is not permissible to combine the tubes with pumps made by other manufacturers, since this may cause considerable errors in indication. Such a combination would offend against relevant regulations.

2 Description
See illustration
Opening time (duration of one pump stroke until the limit chain is completely taut): 15 to 30 seconds



1 and 2 fused tips
3 writing surface
4 prelayer (orange)
5 indicating layer (white) with calibrated scale numerical values = ppm carbon monoxide, valid for n = 10 strokes
6 arrow (must point towards pump during testing)

3 Range of Measurement (20°C, 1013 mbar, corresponding to 20°C, 760 mm Hg)
With n = 10 strokes — 2 to 60 ppm carbon monoxide
With n = 2 strokes — 10 to 300 ppm carbon monoxide
1 ppm CO ≙ 1.17 mg/m³
1 mg CO/m³ ≙ 0.86 ppm } 20°C, 1013 mbar

4 Test and Evaluation of the Result
4.1 Before each series of measurement, check the pump for leaks using an unopened tube.
4.2 Break off the tips of the tube.
4.3 Insert the tube tightly in the pump head. Arrow points towards the pump.
4.4 Suck the air sample through the tube with n = 10 pump strokes. Carbon monoxide turns the white indicating layer brownish-green. The total length of the discoloration is a measure of the carbon monoxide concentration.
Numerical values = ppm carbon monoxide.
4.5 Measurement in the range above 60 ppm
Here the air sample should be sucked through the tube with less than 10 pump strokes. With n = 2 strokes, multiply the value read off by 5. Numerical values = ppm CO.

5 Remarks
The tube cannot be used again even after a negative test result. The discoloration lasts for several days if the tubes are sealed with rubber caps.

6 Influence of Ambient Conditions on the Result of Measurement
6.1 Temperature
The tubes can be used in a temperature range of from −10 to +50°C.
6.2 Humidity
Between 2 and 20 mg H_2O per litre, humidity has no influence on the indication.
6.3 Atmospheric pressure
For pressure correction, multiply the tube reading by the following conversion factor:

$$\text{Conversion factor} = \frac{1013}{\text{actual atmospheric pressure (in mbar)}}$$

7 Specificity (Cross-sensitivity)
The carbon monoxide indication is based on a colour reaction with iodine pentoxide, selenium dioxide and fuming sulphuric acid.
No interference with the indication by, for example, 1,000 ppm hydrogen sulphide, 100 ppm ethyl mercaptan, 800 ppm hydrogen phosphide, 500 ppm phosgene, 500 ppm sulphur dioxide, 3 vol.% hydrogen, 40 ppm nitrogen dioxide, 500 ppm nitrogen monoxide, 100 ppm acetylene or 5 ppm carbon disulphide.

8 Shelf Life
For expiry date and storage temperature, see data on package strip.

9 Important Properties of carbon monoxide

Threshold limit value (USA 1986): (see also any regulations on CO exposure)	50 ppm (55 mg/m³)
Chemical formula:	CO
Molecular weight:	28.01
Boiling point:	−191°C
Melting point:	−205°C
Lower explosive limit:	12.5 vol.%
Upper explosive limit:	74 vol.%
Ignition temperature:	605°C

10 Information
At the request of the tube user, we will supply the following information:
a) The methods used for calibration of the detector tubes.
b) The effects (including reactions) on the operation and accuracy of the gas detecto tube unit caused by specific environmental conditions described by the user, if th effects are known to us.

11 Filter Respiratory Protection
Should filter protection be necessary and acceptable, use filters with the code letters CO

Our table 4340e contains in alphabetical order the gases and vapours measurable wit Dräger tubes, important physical and toxicological data of the gases and vapours as wel as many references to literature.

This table will be sent to you on request.

Caution!
Do not allow used tubes to fall into the hands of children.

Contents are corrosive!

DRAGER HAND PUMP

Summary of Operating Instructions

1. Check the pump for leaks before each series of measurements.
2. Break off both tips of the DRÄGER Tube in the break-off eyelet (Fig. 3) or in the break-off husk (Fig. 4).
3. Tightly insert the DRÄGER Tube in the pump head with the arrow pointing towards the pump (Fig. 5).
4. Hold the pump as shown in Fig. 6.
5. Fully compress the bellows (Fig. 7).
6. Straighten the fingers. The suction process takes place automatically and is completed when the limit chain it taut (Fig. 9).
7. Repeat the suction process as often as specified in the Tube Operating Instructions.
8. Evaluate the indication as described in the Tube Operating Instructions.

DRAGER HAND PUMP

Fig. 2

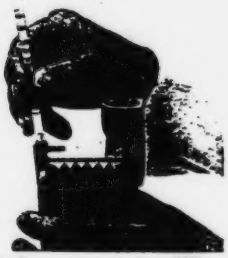


Fig. 3

Fig. 4

Fig. 5

Fig. 6

Fig. 7

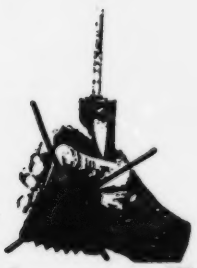


Fig. 8

Fig. 9

RADON MONITORING

RADON MONITORING EQUIPMENT

The RAD surveymeter, manufactured by RAD Service and Instruments Ltd. (Scarborough, Ont.) is an active integrated radon daughter monitoring device. The active system consists of an air pump and a detecting surface. The detection surface is a polycarbonate plastic compound that records radon and thoron daughters as an etching. The air pump is calibrated to expose the etching surface to a constant flow of air. The detection sensitivity is controlled by the pump airflow rate and exposure time.

RAD Installation and Location

The device should be installed in the basement. Ensure that average room air flows are attainable at the site chosen. The detection device should be placed approximately 2 feet above the floor surface to allow pumping of circulated room air. After selecting the site, you are required to plug in the RAD device, complete the data sheet and provide the home occupant with maintenance and removal instructions. The RAD device will be installed for a 7 day period.

Operation of RAD Surveymeter

To start monitoring, connect the unit to any standard wall outlet at the location where measurement is to be taken. Fill in the data label as follows:

1. Detector No. : please write down the home identification and the location where measurement is being taken
2. Starting Time : please write down both the date and time when power is connected

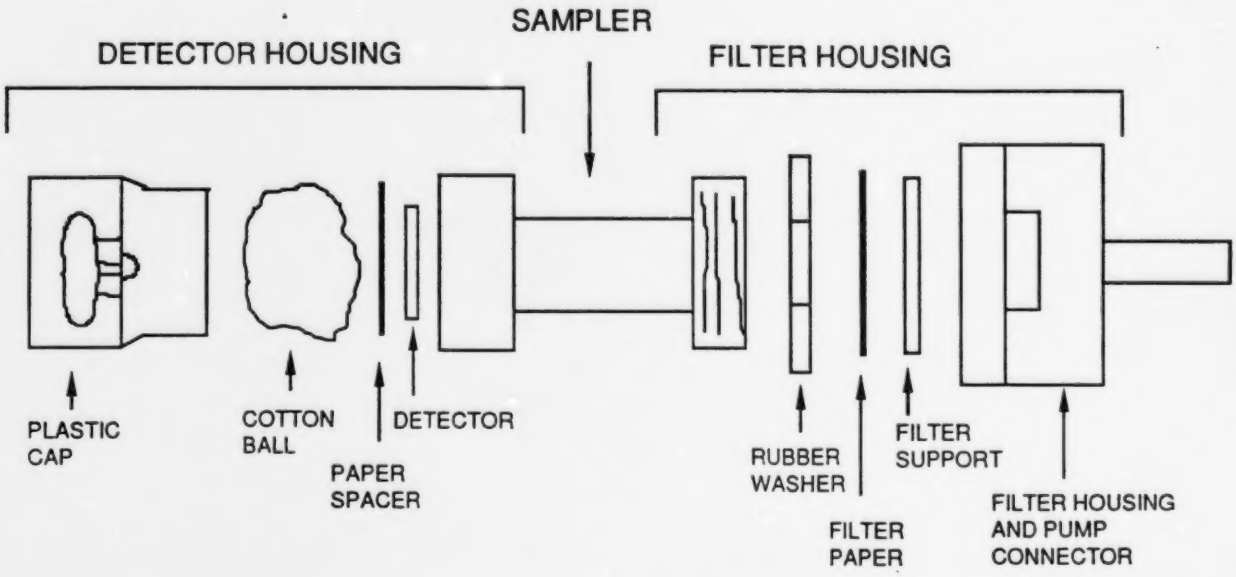
To stop the monitoring after 7 days, unplug the RAD unit; complete the stop date and time on the label and forward the unit to RAD Service and Instruments Ltd. directly for analysis.

RAD M-1 SURVEYMETER

The detecting head assembly is composed of three parts:

1. the Detector housing
2. the Sampler
3. the Filter housing

The diagram below illustrates the assembly.



RADPAC KIT TEST PROCEDURE

1. Remove the canister from the box (retain this package for returning). Record the serial number from the canister label on line 1 of INFORMATION FORM (unfold this sheet).

2. Remove the vinyl sealing tape from around the canister and remove the lid. Replace the tape around the can for safe keeping and place the canister, **OPEN END UP** on top of the lid.

3. Record the **DATE** and **TIME** on **START TEST** line 4 of the INFORMATION FORM.

4. After 48 to 50 hours have elapsed, replace the lid back on canister, and carefully replace the tape to reseal the canister. It is necessary to stretch the tape a little as you wind it on so that the ends will overlap to make a good seal (unsealed canister cannot be analyzed). If the tape is lost or mutilated, replace with plastic electrical insulation tape.

5. Record the **DATE** and **TIME** on **END TEST** line 5 of the INFORMATION FORM.

6. Record on line 6 the type of room, and floor level the canister was exposed in (e.g. basement, 1st floor living room, 2nd floor bedroom, etc.)

7. In the event that further testing needs to be conducted, draw and retain a simple diagram of the room, and mark the approximate location of the canister.

8. Repack the canister into the box along with the INFORMATION FORM, and payment, if not prepaid. Apply adhesive tape to at least three (3) sides of the box.

9. Dispatch the RADPAC package immediately (end of test day). Attach correct postage for FIRST CLASS PARCEL MAIL, or prepay a courier service, or deliver personally.

10. The RADPAC Test Report is mailed to you immediately following analysis by first class mail.

BLP HUMIDITY MONITORS

General Information

- The tubes are shipped in a rigid container which should be set aside during the monitoring period and used for the return shipment of the samplers.
- Though Kimax tubes are much stronger than glass, handle the tubes as you would any glass object.
- The humidity is determined by the change in weight of the tube, cap and its contents, therefore it is critical that no foreign matter (tape, glue, ink) be applied to the tube or its cap.
- Each sampler is packed in a plastic "zip-lock" bag. The tube identification label has three groups of characters called the "Humidity Sampler ID. No.". The middle group of numbers are scribed onto the tube. This will aid you in ensuring that the bag and sampler will always match.
- The humidity samplers are designed for a one-week monitoring period.

Deployment Instructions

1. Decide on sampling location in the building. The sampler is to be placed, horizontally or vertically, in relatively still air conditions. *Do not locate near open air ducts.*
2. To install the sampler for monitoring, open the bag and remove the tube. Remove the cap from the tube. Place the cap into the bag ,and seal the bag. Place the sampler in the desired location. Record the start date and time on the bag label. *It is very important to ensure that the original combination of the bag, sampler, and cap for each sampler are always matched.*
3. The enclosed clip can be stuck to a wall or used to prevent the tube from rolling off a flat surface.
4. At the end of the sampling period, record the stop date and time on the bag label. Place the cap securely into the mouth of the sampler. Seal the bag. Ensure that the identification number scribed on the tube matches the number on the label.
5. If an average temperature is available, include that information on the sampler label.
6. Promptly return the tubes to: Buchan, Lawton, Parent Ltd.
   5370 Canotek Rd.
   Ottawa, Ont.
   K1J 9E6
   Attention : Environmental Testing Group
7. You will be sent a summary of the results within one week after Buchan, Lawton, Parent Ltd. receives the samplers.

IMPORTANT. READ ALL INSTRUCTIONS BEFORE BEGINNING TEST.

1. Remove all materials from the box. You will find:

   - 2 sealed foil bags containing the monitors
   - 2 mounting pins
   - 2 plastic zip lock bags
   - a label to seal the box for return to the laboratory

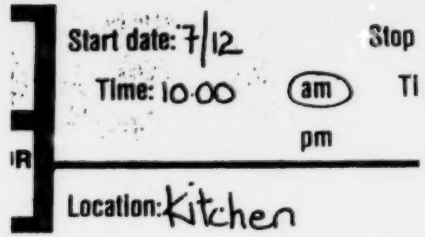
2. Remove the foil bags and pins from the box. **Save the box, the plastic bags, and sealing tape** — you will need them to return the monitors to the laboratory after the test.

3. Open one foil bag by cutting at the notches. Remove the monitor and put the foil bag back in the mailing box.

4. Decide where you want to hang the monitor. Choose a room where combustion appliances (gas stove, water heater, space heater, clothes dryer, etc.) are used, such as a kitchen or living room.

5. Carefully unwind the ribbon and label that are wrapped around the monitor. **DO NOT** detach the ribbon or label from the tube.

6. Fill out the identification label attached to the monitor. Write the sampling **location, start date** and **start time** (to the nearest hour) — be sure to circle **am** or **pm**.



7. Peel the protective paper off the adhesive dot on the bottom of the tube.

8. **Start the test.** Remove the flanged cap and attach it firmly to the adhesive dot on the bottom of the tube.

9. Install the monitor in the room marked on the identification label by pushing the mounting pin through the end of the ribbon and into the ceiling. Hang the monitor at least two feet away from any wall. If you can't hang the monitor from the ceiling, you may shorten the ribbon and hang it from a door jamb or light fixture. DO NOT hang monitors where they may be subjected to strong drafts.

10. Repeat steps 3-9 for the second monitor.

11. Put these instructions in the box so that you will know what to do with the monitors after exposure.

12. Leave the monitors hanging undisturbed for 5-7 days.

STOPPING THE TEST

1. When the test period is over, remove the monitor from the ceiling. **Stop the test immediately** by removing the flanged cap from the adhesive dot and placing the cap tightly over the open end of the monitor, just as it was before the start of the test.

2. Write the **stop date** and **stop time** (to the nearest hour — be sure to circle **am** or **pm** on the identification label. THIS IS VERY IMPORTANT! THE LABORATORY CANNOT GIVE YOU AN ACCURATE RESULT IF THE DATES OR TIMES ARE MISSING.

3. Wrap the label around the monitor and put it in a zip lock bag. Seal the zip lock bag. Repeat for the second monitor. Put the zip lock bags into the foil bags.

4. Put the foil bags containing the exposed monitors in the postage paid return box and seal the box with the tape provided. Put only the foil bags containing the monitors in the box. Mail the box as soon as possible.

TEST RESULTS

You will receive a report by mail in about two weeks. It will show the level of nitrogen dioxide as measured by the monitors. A booklet will be included containing information to help you evaluate the results and compare them to others.

ABOUT THE AIR•CHECK NITROGEN DIOXIDE MONITOR KIT:

The **AIR•CHECK** nitrogen dioxide monitors will sample the air in your home or office. Sampling begins when the cap is removed from the tube. Nitrogen dioxide (NO_2) in the air can then diffuse into the tube, where it will be collected on treated screens. The screens are treated with a non-toxic chemical that absorbs nitrogen dioxide. You will not notice any changes in the monitor during the sampling period. The actual amount of NO_2 collected can be determined only by laboratory analysis.

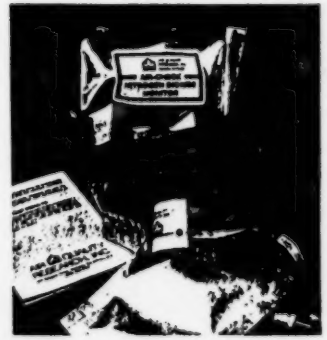
AIR QUALITY RESEARCH, INC.
901 Grayson Street, Berkeley, CA 94710 U.S.A.
(415) 644-2097

WARRANTY

OPERATING CHARACTERISTICS OF THE **AIR•CHECK** NITROGEN DIOXIDE PASSIVE MONITOR (WHEN USED IN ACCORDANCE WITH THE INSTRUCTIONS PROVIDED BY AIR QUALITY RESEARCH INTERNATIONAL, INC.)

	Workplace	Home
Sampling Time:	8 hours	1 week
Minimum Detection Limit:	0.1 ppm	0.005 ppm
Maximum Detection Limit:	10 ppm	0.5 ppm
Accuracy:	± 25%	
Stability:		
Established shelf-life prior to exposure	> 1 month	
Established shelf-life after exposure	> 5 months	

AIR QUALITY RESEARCH, INC. warrants that the goods sold herein will be free from defects in material and workmanship and will meet the aforementioned specifications. This warranty shall be limited to the replacement of defective monitors. IT IS EXPRESSLY AGREED THAT THIS WARRANTY SHALL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND IN LIEU OF THE WARRANT OF MERCHANTABILITY.



INSTRUCTIONS FOR USE OF AIR•CHECK NITROGEN DIOXIDE MONITORS:

WARNING

DO NOT open the vials until you are ready to begin the test.

DO NOT put anything in the vials.